International Urogynecology Journal (2020) 31:613–619
https://doi.org/10.1007/s00192-019-03937-6

ORIGINAL ARTICLE

Perineal massage and training reduce perineal trauma in pregnant women older than 35 years: a randomized controlled trial

Amira S. Dieb[1] · Amira Y. Shoab[1] · Hala Nabil[1] · Amir Gabr[1] · Ahmed A. Abdallah[1] · Mona M. Shaban[1] · Ahmed H. Attia[1]

Received: 2 March 2018 / Accepted: 5 February 2019 / Published online: 2 April 2019

Abstract

Introduction and hypothesis The aim of this study was to evaluate the effectiveness of perineal massage, pelvic floor muscle training (PFMT) and a pelvic floor dysfunction (PFD) prevention educational program in pregnant women above the age of 35 years to prevent perineal tear and episiotomy.

Methods A randomized parallel assignment study involved two groups of pregnant women at the obstetrics outpatient clinic 4 weeks prior to their due date. The first group ($n = 200$) was educated to do digital perineal massage and pelvic floor muscle training and received an educational PFD prevention program. The second group ($n = 200$) received only the prevention education program. Occurrence of perineal laceration was reported at time of delivery as a primary outcome. Statistical analysis was done using the IBM SPSS computer program (Statistical Package for the Social Sciences; IBM Corp, Armonk, NY, USA), release 22 for Microsoft Windows.

Results Delivery was significantly less complicated by perineal tear, episiotomy and postnatal pain in the first than in the second group ($p < 0.05$). Grades of perineal tear were mostly of first and second degree in the first group compared with the second group. We found a significantly lower need for analgesia and fewer ampoules required during the hospital stay in the first group ($p < 0.001$, 0.002, respectively).

Conclusions Performing antenatal digital perineal massage and PFMT in addition to health education is recommended to reduce perineal complications.

Keywords Pregnancy above 35 · Episiotomy · Health education · Pelvic floor muscle training · Perineal massage · Perineal tear

Introduction

The increased risks in pregnancy and delivery above the age of 35 years may prevent most women from expecting an uneventful vaginal delivery. The main concern in this age group is the higher incidence of complications during pregnancy and labor. In a study from South Africa, intrapartum complications such as perineal tears, lacerations and extension of episiotomies occurred in 5.26% of women ≥ 35 years compared with 0.9% in younger women [1]. Pelvic floor soft tissue and neuromuscular injuries often result in significant short- and long-term sequalae. Short-term morbidity includes postpartum pain and dyspareunia in 7–30% between 8 and 48 weeks after delivery [2]. Patients may suffer long-term pelvic floor dysfunctions (PFDs) such as pelvic organ prolapse (POP), urinary incontinence (UI) (15% of patients) and anal incontinence (AI) in 8%. Even after repair of anal sphincter damage, 45% may experience incontinence to flatus [3]. Many women fear such perineal trauma, and this explains the maternal demand for a cesarian section (CS) [4]. Episiotomy, long thought to be protective, is not effective in prevention of severe perineal laceration and may even result in higher perineal trauma rates and late perineal healing [5]. Evidence-based recommendations do not justify a routine episiotomy procedure in normal labor [6]. Moreover, less pain and better intercourse were experienced by women with an intact perineum following vaginal birth [7].

Many interventions are suggested to improve postpartum perineal outcomes. Maintaining sexual activity during

✉ Amira S. Dieb
amirasaied2026@gmail.com; amirasaied2026@cu.edu.eg

[1] Department of Obstetrics and Gynecology, Kasr AlAini Hospital, Faculty of Medicine, Cairo University, ElSaraya Street, Manial, Cairo P.O. Box 11956, Egypt

pregnancy, antenatal pelvic floor dysfunction (PFD) health education including proper postures and times for micturition, a diet rich in fluids and fibers, weight control, stopping smoking, perineal hygiene and regular perineal examinations may protect against perineal tears [8].

Also antenatal perineal massage can protect the integrity of the perineum and reduce the number and severity of lacerations. Starting from the 34th gestational week, perineal massage is performed by the pregnant woman or her partner for 4 min 3–4 times a week or for 10 min once a week. It helps increase elasticity and reduce the risk of perineal trauma from episiotomy or spontaneous tears. It also helps desensitize the women to the perineal burning sensation and pain during labor [9].

Pelvic floor muscle training (PFMT) during pregnancy may also counteract the effect of increased intra-abdominal pressure caused by the growing fetus, the hormonally mediated decreased urethral pressure and the increased laxity of pelvic connective tissue [10]. Trained muscles are less liable to injury and easily heal after damage. In addition, PFMT improves the strength and function of the puborectalis and inner and outer anal sphincter muscles, positively affecting anal continence. The recommended schedule of PFMT is three sets of 8–12 maximum contractions done 3–4 times weekly [10]. Many studies have compared perineal massage and PFMT, but the results were conflicting [11, 12].

Limited data are available on the impact of applying both perineal massage and PFMT for the reduction of perineal lacerations and episiotomy rates, particularly in older pregnant women. The fear of perineal trauma may lead these patients to request elective cesarean delivery, and many practitioners may recommend it. These reasons showed the need for conducting a study in Egypt to evaluate the effect of digital perineal massage, PFMT and an education program on strengthening the pelvic floor in those older patients willing to have a safe vaginal delivery with the fewest complications.

Materials and methods

Pregnant participants were recruited between April 2017 and December 2017 at the obstetrics outpatient clinic in Kasr ElAini Hospitals, Cairo University, Egypt, during their antenatal visits 4 weeks before the due date. Inclusion criteria included: pregnant women ≥ 35 years old, nullipara or multipara. Exclusion criteria included history of chronic constipation, chronic cough, current or past urinary or anal incontinence, genital prolapse before pregnancy, neuromuscular or connective tissue disorders, medical disorders, history of preterm or precipitate labor, premature preterm rupture of membranes, genital infections, grand multiparity, previous CS, epidural anesthesia and instrumental delivery.

For the primary outcome, sample size calculation was done by comparing the proportion of patients having perineal tears between the two study groups. Calculation was done by comparing two proportions from independent samples using the chi-square test; the α-error level was set at 0.05, and the power was fixed at 90%. As previously published, the prevalence of perineal tears among women at delivery was 40% [13]. Setting the clinically important difference in the proportion of patients having perineal tears between study groups at 15%, the optimum sample size needed to be at least 200 cases in each group. Sample size calculation was done using the Minitab software statistical package, version 18.1 (Minitab Inc., USA, 2017).

The study was approved by the local ethics committee. The trial was registered at ClinicalTrials.gov, no. NCT03287258. Written informed consent was obtained from each participant after full explanation of the aim of the study.

The flow chart of the study is shown in Fig. 1. The pregnant women were randomized into two groups. Randomization was done by withdrawing closed envelopes for each patient into group A and group B. The first group (A) consisted of 200 patients and was educated to do digital perineal massage and perform PFMT and received the usual PFD prevention educational program. The second group (B) consisted of 200 patients who received the PFD educational program alone. Personal data included age, parity, level of education (illiterate, primary/ middle school or high school/university) and occupation (housewife, official or unofficial employment).

The patients were examined for vital signs, BMI, routine antenatal examination and local perineal examination.

The educational program was based on the following recommendations: correct micturition (postures and times), adequate ingestion of fluids and fibers, weight control, smoking cessation, perineal hygiene and regular examination of perineal areas.

The health practitioner instructed the patients on how to do digital perineal massage. It involved gentle insertion of one or two fingers or the thumb 3–5 cm into the vagina and doing an up-/downward and side-to-side massage for 5 min, using a hypoallergenic lubricant (such as olive oil or KY jelly). An initial mild burning sensation was felt by the patients, but they were reassured that it would diminish over time. The procedure was stopped when there was discomfort, but the patients were motivated to continue the massage. It was advised not to massage if vaginal infection or genital herpes was present. Partners were encouraged to do the massage at home. It was done three times weekly.

The women next were taught how to do PFMT. They first felt the perineal muscles working by sitting or lying down with the muscles of the thighs, buttocks and stomach relaxed.

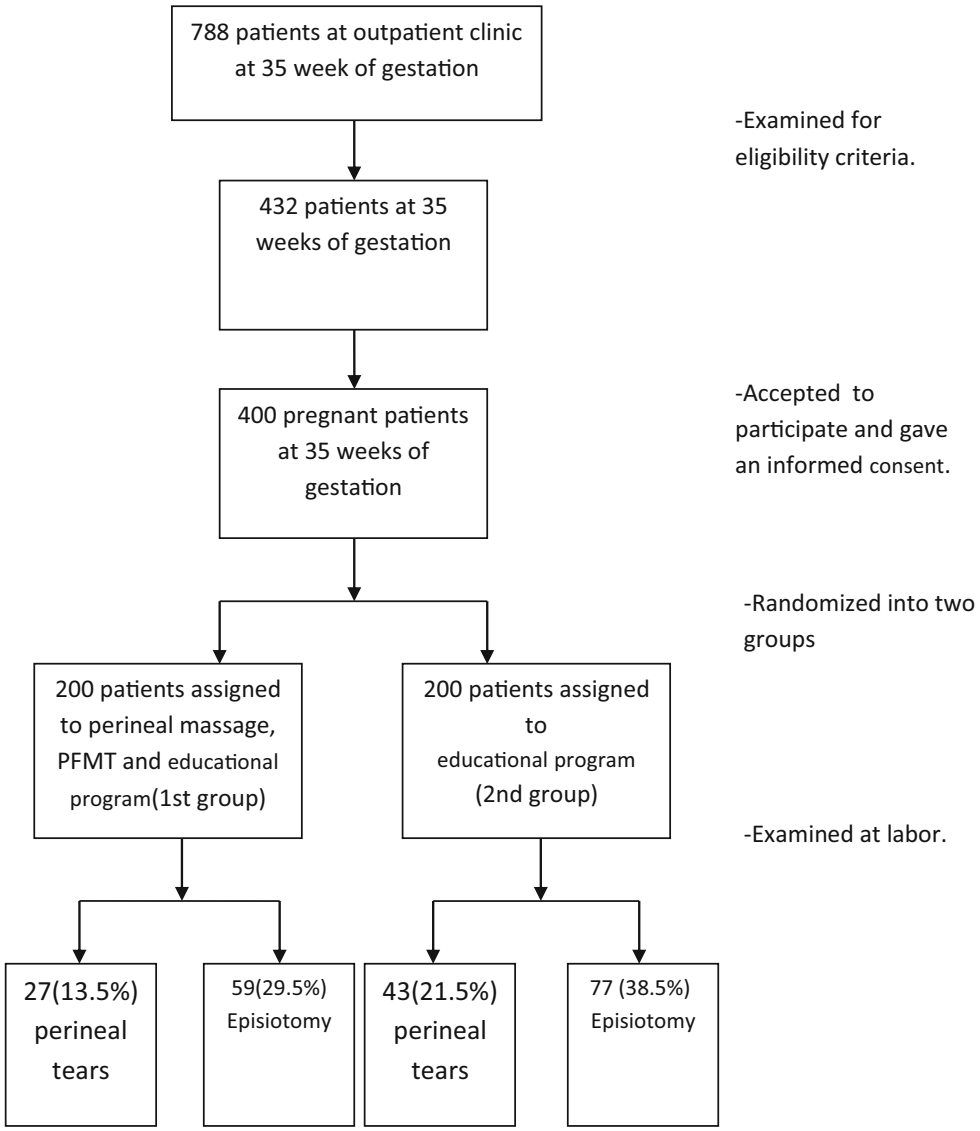

Fig. 1 Study data flow chart

Then, they squeezed the muscles around the anus as if trying to stop passing wind without squeezing the buttocks and then relaxed. Also, when sitting on the toilet to empty the bladder, they tried to stop the stream of urine and then start it again. The "squeeze and lift" movements of the muscles around the back passage and vagina and letting go were repeated in three sets of 8 to 12 squeezes each day when lying down and sitting. The patient learned to count to 8 s for each squeeze and rest for 8 s. If she could not hold for 8 s, she did it for as long as possible. The physician instructed each participant to follow the program of her group.

At the time of labor, in the casualty department, all routine care is done without intervention in any stage of labor management or the decision for a cesarean delivery. The recorded data included perineal tear and its degree as primary outcome, while secondary outcomes included duration of the second stage of labor, fetal distress during the second stage, need for episiotomy, need for urgent CS, paraurethral tear, baby's weight, sex, Apgar score at 1 and 5 min, verbal rating score for postpartum pain within 24 h and after 15 days, the need for analgesia and post-partum dose of analgesics.

In the present study, the data were collected on a Microsoft Excel Sheet, 2010. Data were statistically described in terms of mean ± standard deviation (± SD) or frequencies (number of cases) and percentages when appropriate. Comparison of numerical variables between the study groups was done using Student's t-test for independent samples. For comparing categorical data, a chi-square ($\chi 2$) test was performed. An exact test was used instead when the expected frequency was < 5. A p value < 0.05 was considered statistically significant. Statistical calculations were done using the IBM SPSS computer program (Statistical Package for the Social Science; IBM Corp., Armonk, NY, USA) release 22 for Microsoft Windows.

Results

Important clinical and demographic characteristics of participating mothers are provided in Table 1. Participants were predominantly housewives (49.5% and 47%, respectively, in the first and second groups). In the intervention group more patients were highly educated than in the second group. Both groups were similar in age, parity and duration of pregnancy. More obese patients (BMI ≥ 25 kg/m^2) participated in the intervention group.

The variables during labor, fetal weight, sex, fetal distress and Apgar scores are shown in Table 2. No significant differences were found between both groups except for the Apgar scores.

Other important variables during the second stage of labor are shown in Table 3. Labor was significantly less complicated by perineal tear, paraurethral tear and episiotomy in the first group. Grades of perineal tear were mostly of the first and second degrees in the first group compared with the second group. A significant positive correlation was found between the BMI and rate of perineal laceration in both groups ($p < 0.001$). Women with higher BMI had 3 and 8.5% rates of severe perineal lacerations (third and fourth grades) in the first and second groups, respectively. Also the postpartum pain, need for analgesia, dose of non-steroidal anti-inflammatory drugs (NSAID) and days of hospital stay were significantly in favor of the first group. In addition, the verbal rating of pain during the first 24 h and 2 weeks in the postpartum period were mostly milder in the massage/PFMT group.

Discussion

Many patients above the age of 35 years and many obstetricians may prefer elective cesarean sections for the sake of safety or fear of vaginal birth complications. However, the cesarean delivery itself has its own risk of maternal and fetal complications and is an economic burden on individuals and communities. Its risk may extend to affecting future pregnancies [14]. The rates of cesarean section in our country (51.8%) exceed the global rate (18.6%) [15]. Thus, more effort is needed to encourage safe vaginal birth and implement practical interventions.

Our study represents an example of these practical interventions. We applied the use of perineal massage and PFMT on pregnant Egyptian women above the age of 35 years during their last 4 weeks of antenatal care. Compared with the control group, we found that the rates of perineal lacerations, episiotomy, postpartum pain and use of postpartum analgesics were significantly reduced.

Regarding the demographic characteristics of our studied groups, more highly educated women participated in the intervention group ($p < 0.001$), which encouraged them to commit to the program and continue the follow-up visits. More women with higher BMI ≥ 25 kg/m^2 were in the intervention group than in the control group (84 and 68.5%, respectively). A significantly higher rate of perineal tears was found in obese women in both groups ($p < 0.001$). This agrees with the results of some studies [16, 17] but disagrees with another study of 210,678 primiparous deliveries, in which women with BMI > 30 kg/m² had a lower risk of grade 3 and 4 perineal tears [18].

Table 1 Demographic characteristics of the studied groups

Variable	First group ($n = 200$)	Second group ($n = 200$)	p value
Maternal age (mean ± SD)	38.29 ± 1.90	37.90 ± 3.47	0.707
Parity			0.174
Primipara, *n* (%)	59 (29.5%)	47 (23.5%)	
Multipara, *n* (%)	141 (70.5%)	153 (76.5%)	
Education			< 0.001*
Illiterate, *n* (%)	59 (29.5%)	95 (47.5%)	
Primary/middle school (6–12 years) *n* (%)	40 (20%)	45 (22.5%)	
High school/university, *n* (%)	101 (50.5%)	60 (30%)	
Profession			0.754
Housewife, *n* (%)	99 (49.5%)	94 (47%)	
Official, *n* (%)	60 (30%)	67 (33.5%)	
Unofficial sector, *n* (%)	41 (20.5%)	39 (19.5%)	
Gestational age at time of labor (mean ± SD)	38.54 ± 1.62	38.66 ± 2.08	0.52
BMI (mean ± SD)	29.32 ± 3.81	28.84 ± 5.05	0.29
< 25 kg/m^2, *n* (%)	32 (16%)	63 (31.5%)	< 0.001*
≥25 kg/m^2, *n* (%)	168(84%)	137(68.5%)	

n number of patients, *SD* standard deviation, *BMI* body mass index

*Significant when $p < 0.05$

Table 2 Variables during labor and newborns

Variable	First group ($n = 200$)	Second group ($n = 200$)	p value
Augmentation of labor, n (%)	36 (18%)	26 (13%)	0.11
2nd stage duration (mean ± SD)	44.20 ± 15.88	44.98 ± 20.43	0.67
Birth weight in grams (mean ± SD)	3.03 ± 168.85	3.05 ± 191.10	0.29
Male sex of fetus, n (%)	104 (52%)	113 (56.5%)	0.21
Fetal distress, n (%)	17 (8.5%)	10 (5%)	0.12
Apgar score 1 min (mean ± SD)	7.57 ± 1.66	7.16 ± 2.12	0.03*
Apgar score 5 min (mean ± SD)	9.88 ± 0.59	9.48 ± 1.14	< 0.001*

*Significant when $p < 0.05$

The incidence of perineal tear in the intervention group was significantly lower (13.5%) than in the control group (21.5%). This agrees with the results of most recent studies on the prophylactic effect of perineal massage during the antepartum period [11, 19], while other studies did not find a significant effect [19, 20]. The positive effect of perineal massage was most obvious when it was done during the antenatal period at least 4 weeks before the due date for greater elasticity of tissues and desensitization of the burning pain sensation during labor [9, 11, 21].

In the current study, the rate of first-degree perineal tears was higher in the first group, while the rate of second-, third- and fourth-degree tears was significantly lower than in the second group. However, the effect of PFMT on prevention of perineal lacerations was controversial. In some studies, no statistical difference was found between the exercise and control group [21, 22], but the results of perineal massage were encouraging in other studies [20, 23]. In the Ali study, which was conducted in Egypt, laceration occurred in 42, 53.3 and 70% of the massage, exercise and control group, respectively, with a significant difference in the degree of laceration ($p < 0.001$) [12]. Other studies reported different results where similar rates of first- and second-degree laceration were found in both the massage and control group and higher rates of third and fourth degrees in the control group [24]. Low certainty evidence found that selective episiotomy may reduce severe perineal/vaginal trauma (mainly third- and fourth-degree tears) compared with liberal episiotomy (11 trials, 6177 women, RR 0.70, 95% CI 0.52–0.94) [25].

Table 3 Comparison of perineal outcomes between the studied groups

Variable	First group ($n = 200$)	Second group ($n = 200$)	p value
Perineal tear, n (%)	27 (13.5%)	43 (21.5%)	0.034*
Degree of perineal tear			
Grade I, n (%)	8 (4%)	4 (2%)	0.026*
Grade II, n (%)	12 (6%)	19 (9.5%)	
Grade III, n (%)	7 (3.5%)	15 (7.5%)	
Grade IV, n (%)	0 (0%)	5 (1.3%)	
Paraurethral tear, n (%)	18 (9%)	27 (13.5%)	0.103
Episiotomy, n (%)	59 (29.5%)	77 (38.5%)	0.045*
Verbal rating score for pain in the 1st 24 h			
Mild (n,%)	179 (89.5%)	153 (76.5%)	0.001*
Moderate (n,%)	10 (5%)	15 (7.5%)	
Severe (n,%)	11 (5.5%)	32 (16%)	
Verbal rating score for pain after 15 days			
No pain (n,%)	185 (92.5%)	172 (86%)	0.013*
Mild (n,%)	15 (7.5%)	18 (9%)	
Moderate (n,%)	0 (0%)	5 (2.5%)	
Severe (n,%)	0 (0%)	5 (2.5%)	
Need for postpartum analgesia more than usual, n (%)	21 (10.5%)	49 (24.5%)	< 0.001*
Number of ampoules of parentral NSAIDS (mean ± SD)	0.36 ± 0.85	1.16 ± 1.99	< 0.001*
Number of days of hospital stay (mean ± SD)	1.23 ± 0.65	1.58 ± 1.42	0.002*

*Significant when $p < 0.05$

In our study, episiotomy was done in 29.5 and 73.5% in the first and second group, respectively ($p < 0.001$). In other studies, episiotomy rates were 20, 36.7 and 42.8% of pregnant women in the massage, exercise and control groups, respectively ($p = 0.031$) [12]. A similar prophylactic effect was found in other studies [7, 11]. Other studies opposed these results, especially of perineal massage [24].

Verbal rating of pain during the first 24 h denoted milder pain in the intervention group than in the control group, while in the subsequent 15 days no pain was reported in 92.5% and 86% of the intervention and control groups, respectively. This was consistent with the Cochrane pregnancy and childbirth database on perineal massage [26]. Also, in the study by Donmez et al., prenatal massage and PFMT were found to reduce perineal pain during the first 24 h and 15 days following vaginal delivery [11]. Other studies found no difference and non-encouraging results related to the massage groups [27].

No significant difference was found in the duration of the second stage of delivery. This result agrees with those of other studies [11, 22].

There was no statistically significant difference between the rate of augmentation of labor between the studied groups ($p = 0.11$). This may differ from other studies, which found a statistical difference especially in the massage group [20, 23].

Most benefits of perineal massage and PFMT performed in the last 4 weeks of pregnancy are mainly attributed to the increased tone and elasticity of the perineum, which reduces the possibility of laceration in vaginal deliveries and protects the integrity of the perineum so healing of an episiotomy wound will be faster [11].

A limitation of our study was the short duration of follow-up. Thus, we could not assess the patients for long-term complications of PFD such as urinary incontinence, anal sphincter dysfunction and pelvic organ prolapse. This may be attributed to the distant residence of most patients from our tertiary hospital and difficulty contacting them.

Another limitation was the inability to use the number of suture packs as a countable variable in the studied groups. Different absorbable synthetic suture materials are used in our department, such as standard polyglactin (Vicryl), fast or rapidly absorbing polyglactin (Vicryl Rapide), standard polyglycolic acid (Dexon) and chromic catgut, to repair perineal trauma. In other studies, conflicting results were found regarding the significant differences between the studied groups [20, 28]. Another limitation of the study was the lack of physiotherapists doing the PFMT.

What makes this study unique is the evaluation of the effect of both digital perineal massage and PFMT in addition to the education program on strengthening the pelvic floor. Another strength is that it involved patients above the age of 35 years. The large sample size was a strength of the study (200 in each group) compared with other similar studies. In the Donmez study, 30, 32 and 39 cases were assigned to the massage, exercise and control groups, respectively [11]. In the Ali study, 70, 75 and 80 cases were recruited in the massage, exercise and control groups, respectively [12]. We also studied the need for analgesia and the number of ampoules required during the hospital stay. We found a strongly significant difference between the studied groups ($p < 0.001$ and 0.002, respectively).

Based on the results of this current study, antenatal digital perineal massage and PFMT reduce the episiotomy and perineal laceration rates, postnatal perineal pain and dosage of analgesia. This is of utmost value for women above the age of 35 years, helping them choose vaginal delivery when indicated. Also, this encourages health care professionals to have correct knowledge and provide instructions so that the patients can give birth with no fear and minimal complications.

Compliance with ethical standards

Conflicts of interest None.

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